UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/562,154	12/23/2005	Snjezana Boger	016906-0459	6580

22428 7590 10/14/2010
FOLEY AND LARDNER LLP
SUITE 500
3000 K STREET NW
WASHINGTON, DC 20007

EXAMINER	
SHEVIN, MARK L	

ART UNIT	PAPER NUMBER
1733	

MAIL DATE	DELIVERY MODE
10/14/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/562,154	BOGER ET AL.	
	Examiner	Art Unit	
	MARK L. SHEVIN	1733	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 August 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4,5,7-12 and 14-43* is/are pending in the application.

4a) Of the above claim(s) *7-12,14,16-18,20-34,37,38 and 42* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4,5,15,19,35,36 39-41, and 43* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *08/09/2010*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

1. Claims 1, 4, 5, 7-12, 14-43, filed August 19th, 2010, are currently under examination. Claim 1 is amended , claims 7-12, 14, 16-18, 20-34, 37, and 39 are withdrawn, and claims 42 and 43 are new. However new claim 42 is withdrawn as explained in the following section.

Withdrawal of New Claim 42

2. Claim 42 is withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim, see (MPEP 821, para 3). Election was made **without** traverse in the reply filed on December 19th, 2008.

Applicants elected Species D, oxide nanoparticles, for prosecution of the merits in the response filed December 19th, 2008 however dependent claim 42 is directed to limiting the nanoparticles in the brazing flux claim 1 to a carbide of transition metal of groups IV and V, which is mutually exclusive with the elected species of oxide nanoparticles.

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted August 9th, 2010 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement has been considered by the examiner. Please refer to applicants' copy of the 1449 form submitted herewith.

Claim Rejections - 35 USC § 103

4. **Claims 1, 4, 5, 15, 19, 35, 36, 39, 40, 41, and 43** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Peng** (CN 1413797 – Full Translation) in view of **Ishii** (US 5,916,635) and **Englert** (EP 1287941 – Full translation).

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Peng:

Peng discloses a method of soldering aluminum and copper pipes together using an active connection agent prepared from nanometer powder which was added to water, organic cellulose, and flux through mixing. Thus nanoparticles are added to a base material to produce a non-corrosion flux. The nanoparticles has a size range of 20 nm - 100 μm (claim 2). The active bonding agent of Peng's invention includes nanopowder, a non-corrosive flux, and a binder (p. 5, para 2) and the material is designed for brazing (p. 7).

Peng is silent as to the volume percentage and particular type of the nanoparticles in the brazing flux material.

Ishii:

Ishii is drawn to producing hydrophilic coatings for the aluminum fins of heat exchangers (Abstract). Such hydrophilic coatings are used to let condensing water spread out over the surface of fins rather than forming globules which increase resistance to air flow and lower heat exchanger efficiency (col. 1, lines 20-35).

Hydrophilic coatings are produced by spreading a mixture of colloidal silica (Silicon dioxide, SiO_2), water-soluble polymers, and anionic surfactants over aluminum fins and drying by heating (col. 3, lines 1-10). The colloidal silica may be alkali-stabilized silica with a particle diameter of 5 to 100 nm, preferably 10 to 30 nm (col. 3, lines 19-25).

The total weight of the polymer and silica nanoparticles in the mixture is 4 to 20 wt% (col. 3, lines 9-10).

Furthermore, neither Peng nor Ishii teach the precise composition of the flux.

Englert:

Englert addresses these deficiencies and is drawn to a flux composition for brazing of aluminum parts (Title and para 0001). The preferred flux is NOCOLOK™ a potassium fluoroaluminate, preferably $K_{1-3}AlF_{4-6}$ in the form of a eutectic with a melting point of 562-572 °C (para 0003 and 0018). The flux is mixed with a solvent and binder where the binder is a polymer such as polyurethanes, synthetic resins, phthalates, acrylates, vinyl resins, or polyolefins and the binder is present between 0.1 and 30 wt% (para 0016 and 0020). The advantage of using Englert's inventive flux is that it overcomes the problems associated with fluxing of aluminum-based parts for soldering, such as post-fluxing cleaning (para 0006-0008).

Regarding claims 1, 15, and 43 Peng discloses a non-corrosive (claim 1), brazing flux (p. 7) with activated nanopowder of 20 nm - 100 μm size (claim 2) with a binder of water and organic cellulose (claim 3). The binder is a "base material", the activated nanopowder are “nanopowders” and the “nanoparticles are dispersed in an organic

polymer" as cellulose is an organic polymer and as it is a binder, the nanoparticles are therefore dispersed in it.

It would have been obvious to one of ordinary skill in fluxes, at the time of the invention, to have modified Peng in view of Ishii to include from 0.01 to 10 vol% of nanoparticles such as silica (SiO_2) as Ishii taught that the inclusion 4 – 20 combined weight percent of colloidal silica nanoparticles and polymer in a coating composition for aluminum materials that are heated, just as with Peng's brazing flux, and Ishii taught that such silica nanoparticles allow the formation of hydrophilic coatings that condensing water spread out over the surface of heat exchanger fins rather than forming globules which increase resistance to air flow and lower heat exchanger efficiency (col. 1, lines 20-35).

Ishii taught that the total weight of polymer and nanoparticles should be in the range of 4 to 20 wt% and the Examiner holds that the content of nanoparticles and residual polymer would overlap the claimed ranges of 0.01 to 10 vol% and 0.1 to 1 vol% when converted to volume percent.

It would have been obvious to one of ordinary skill in fluxes, at the time of the invention, to select any portion of the claimed range of nanoparticle volume percentages, including the claimed range, from the overlapping range of nanoparticle and polymer content disclosed in Ishii because Ishii finds that the prior art composition in the entire disclosed range has a suitable utility (coating composition for Al material and for heat exchangers in particular) and the normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine

where in a disclosed set of percentage ranges is the optimum combination of percentages."); *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). From MPEP § 2144.05: In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990).

With respect to the recitation of claim 1 stating: "…for the brazing of individual heat exchanger parts...", this addition is intended use as it does not limit the structure of the claimed flux beyond the explicit contents of nanoparticles, base material, and the state of dispersion of the nanoparticles.

With respect to adding "…wherein the comprise nanoaggregates dispersed in an organic polymer", Peng's nanoparticles are dispersed in an organic polymer of cellulose and Ishii's nanoparticles of silica are dispersed in a water-soluble polymer of the carboxylic group (col. 3, lines 18-67), both of which are organic polymers. Furthermore, Ishii discloses an overlapping total content of polymer (col. 3, lines 9-10). From these similarities in composition of the flux, one of one of ordinary skill in the fluxes would have reasonably expected that the flux of Peng in view of Ishii contain at least some nanoaggregates formed from the constituent nanoparticles ("comprise nanoaggregates).

Where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been

established. Furthermore, "when the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not" and "the PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product. Whether the rejection is based on 'inherency' under 35 U.S.C. 102, on '*prima facie* obviousness' under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same..." (MPEP 2112, section V, para 1).

With respect to the amendment to claim 1 adding "wherein the base material used is potassium fluoroaluminates...", it would have been further obvious to one of ordinary skill in the art to chose a proven noncorrosive flux for aluminum in Nocolok ($K_{1-3}AlF_{4-6}$) as disclosed by Englert as Englert teaches that his flux for brazing aluminum overcomes the prior art problems associated with fluxing of aluminum based parts for brazing.

With respect to the amendment to claim 1 stating "wherein a starting material for the nanoparticles is carbon and/or oxides, oxide hydrate, nitrides and/or carbides of transition metals, and/or cerium" and the recitation of claim 43 stating "wherein a starting material for the nanoparticles comprise a material selected from the group consisting of oxides, oxide hydrates, carbides of transition metals, and cerium", these recitation limit the "starting material" of the nanoparticles, which appears to be limiting an intermediate structure, not a final claimed structure in the form of a brazing flux product as reflected in the body of the claim requiring "nanoparticles between 0.01 - 10 vol%". Nevertheless, Ishii taught the inclusion of silica nanoparticles, which is an oxide

of silicon, and thus are "oxides" within the meaning of both listings in the last clause of claims 1 and 43.

Regarding claim 4, this claim is rejected for the same reasons as stated for claims 1 and 15 above, in that Ishii taught that the total weight of polymer and nanoparticles should be in the range of 4 to 20 wt% and the Examiner holds that the content of nanoparticles and residual polymer would overlap the claimed ranges of 0.01 to 10 vol% when converted to volume percent, and it would have been obvious to optimize within the disclosed ranges of polymer and nanoparticles per MPEP 2144.05.

Regarding claim 5, it would have been obvious to one of ordinary skill in fluxes, at the time the invention was made, to combine Peng in view of Ishii and Englert to form a flux with nanoparticles that includes a polymer that can withstand the demands of brazing as Ishii teaches that his polymeric binders will have poor results after heating to normal brazing temperatures and thus one would look to modify Ishii by looking to other polymeric binders for use in a brazing flux composition as taught by Englert and reinforced by Peng's disclosure of nanoparticles in a flux composition. Englert teaches that his flux including polymeric binders is used for brazing of aluminum at temperatures of above 450 °C and preferably above 560 °C. Englert discloses polyurethanes, synthetic resins, phthalates, acrylates, vinyl resins, or polyolefins, which are all members of the claimed Markush group.

With respect to the recitation that the polymer used is "organic", Englert's polyurethanes, synthetic resins, phthalates, acrylates, vinyl resins, or polyolefins are all

organic polymers as they have carbon (thus organic) and are members of the Markush group said to be all organic polymers.

Regarding claims 19 and 39, Ishii taught the inclusion of silica nanoparticles, which is an oxide of silicon, and thus are "oxides" in the Markush group of claim 39.

Regarding claims 35 and 36, it would have been obvious to one of ordinary skill in the art at the time of the invention to choose the instantly claimed size ranges of nanoparticles through process optimization, since it has been held that there the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. Peng disclosed the nanoparticles as being in the range of 20 nm - 100 nm (claim 2) but did not give reasons for this size range while Ishii taught that the nanoparticles should be in the range of 5 nm (reads on 'few nanometers') – 100 nm because the particles agglomerate below about 5 nm and adversely affect the stability of the coating composition when larger than 100 nm (col. 3, lines 1-35).

Regarding claim 40, this claim is rejected for the same reasons as claim 5 above because Peng in view of Ishii was used to reject claim 39 as Ishii taught the inclusion of nanoparticles of oxide in using silica nanoparticles while the instant rejections use Englert to modify the brazing flux of Peng in view of Ishii to include any one of the claimed binders to improve performance when brazing aluminum as is sought by Peng.

Regarding claim 41, this claim is rejected for the same reasons as stated for claim 4above, in that Ishii taught that the total weight of polymer and nanoparticles should be in the range of 4 to 20 wt% and the Examiner holds that the content of

nanoparticles and residual polymer would overlap the claimed ranges of 0.1 to 1 vol% when converted to volume percent, and it would have been obvious to optimize within the disclosed ranges of polymer and nanoparticles per MPEP 2144.05.

Response to Applicant's Arguments:

5. Applicant's arguments filed August 19th, 2010 have been fully considered but they are not persuasive.

Applicants' assertions (p. 8, para 8 to p. 9, para 2) with respect to the previous 112 2nd indefiniteness issue of claim 35 are moot in view of the withdrawn of that rejection in view of Applicants' remarks filed August 19th, 2010.

Applicants assert (p. 9, para 3-5) that Peng does not disclose or suggest a brazing flux having nanoparticles in an amount between 0.01 - 10 vol% wherein the nanoparticles comprise nanoaggregates dispersed in an organic polymer.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicants (p. 10, para 2-4) that Ishii does not remedy the deficiency of Peng regarding nanoparticles comprising nanoaggregates and that Ishii teaches away from a flux including nanoaggregates by teaching that anionic surfactants counter problems due to agglomeration of silica.

In response, claim 1 only requires that the nanoparticles *comprise* nanoaggregates dispersed in an organic polymer, where there is no definition or clear delineation of what degree of agglomeration constitutes nanoparticles being "nanoaggregates" or even if nanoaggregates are agglomerates. However, in view of the substantial similarity in flux composition, nanoparticle content, oxide nanoparticles, and polymer content, one of ordinary skill in fluxes would have reasonably expected that the flux of Peng in view of Ishii contain at least some "nanoaggregates" formed from the constituent nanoparticles ("comprise nanoaggregates).

Applicants assert (p. 10, para 5) that one of ordinary skill in the art would not have combined the teaching of Peng and Ishii to arrive at the invention of claim 1 because the claimed flux is designed for use in an inert gas atmosphere while Peng's flux is designed for use in a normal atmosphere.

In response, the use of an inert gas atmosphere is not a claimed feature of any of the pending claims.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

-- Claims 1, 4, 5, 15, 19, 35, 36, 39-41, and 43 are finally rejected
-- No claims are allowed

The rejections above rely on the references for all the teachings expressed in the texts of the references and/or one of ordinary skill in the metallurgical art would have reasonably understood or implied from the texts of the references. To emphasize certain aspects of the prior art, only specific portions of the texts have been pointed out. Each reference as a whole should be reviewed in responding to the rejection, since other sections of the same reference and/or various combinations of the cited references may be relied on in future rejections in view of amendments.

All recited limitations in the instant claims have been met by the rejections as set forth above. Applicant is reminded that when amendment and/or revision is required, applicant should therefore specifically point out the support for any amendments made to the disclosure. See 37 C.F.R. § 1.121; 37 C.F.R. Part §41.37 (c)(1)(v); MPEP §714.02; and MPEP §2411.01(B).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark L. Shevin whose telephone number is (571) 270-3588 and fax number is (571) 270-4588. The examiner can normally be reached on Monday-Friday, 8:30 am to 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V. King, can be reached at (571) 272-1244. The fax number for the organization where this application or proceeding is assigned is (571) 273-8300.

/Mark L. Shevin/
Examiner, Art Unit 1733

October 4th, 2010
10-562,154

/George Wyszomierski/
Primary Examiner
Art Unit 1733